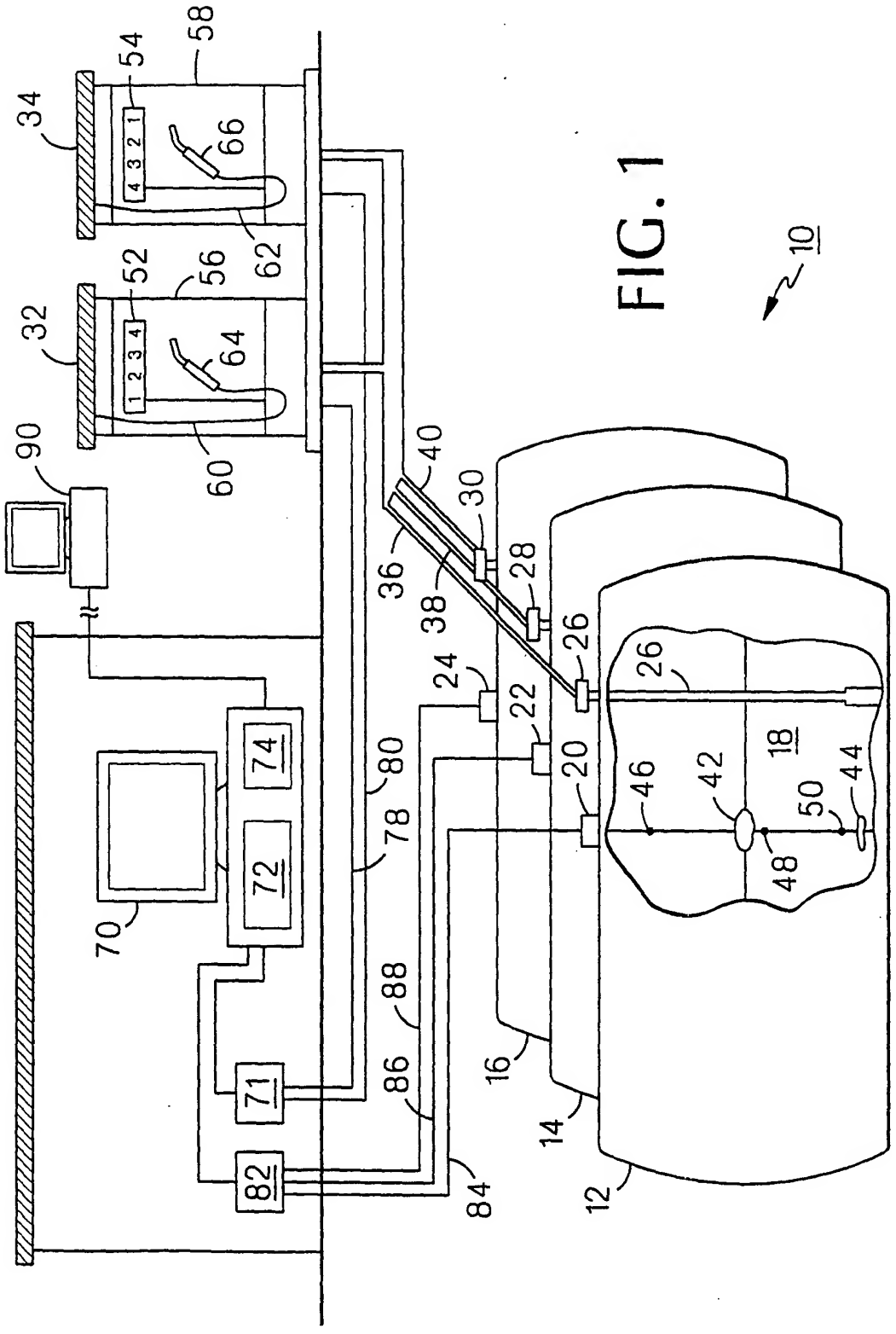
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
70
71
72
74
78
80
82
84
86
88
90
1 2 3 4
4 3 2 1

FIG. 1

$M := (XX^T \cdot XX)$ $N := (XX^T \cdot YY)$

$P := M + OX$ $Q := N + OY$

$big\beta := P^{-1} \cdot Q$

$augX := X$

$augX_{n,4} := 0$

$augXX := XX$

$augXX_{n,4} := 0$ $newdels := 0$

$bdel := 4..rows(\beta)$ $newdels := if(rows(\beta) > 3, \beta_{bdel}, 0)$

non-scalar value

$TREND := (big\beta_2) \cdot 60$

$TREND2 := [(big\beta_4) \cdot 60] + TREND$

FIG. 2

$OX := READPRN(oldxtx)$ $OY := READPRN(oldxty)$ $OD := READPRN(olddeliveries)$

$od := 0$

$$od := \sum_{j=1}^{rows(OD)} OD_j$$

$XX_{1,1} := 1$ $YY_{1,1} := Y_{1,1} - od$

$XX_{n,1} := 1$ $YY_{n,1} := (Y_{n,1} - od) - if[(rows(Num\_Del) > 1), if[(Comp_{n,11}) > (Num\_Del_{h,2}), \beta_{h+\beta shift}, 0], 0]$

$$XX_{1,2} := \left(\frac{Comp_{1,11}}{60}\right) \cdot (-1)$$

$$XX_{n,2} := \left(\frac{Comp_{n,11}}{60}\right) \cdot (-1)$$

$$XX_{1,3} := \left(Comp_{1,12}\right) \cdot (-1)$$

$$XX_{n,3} := \left(Comp_{n,12}\right) \cdot (-1)$$

$XX_{1,4} := X_{1,2}$

$XX_{n,4} := X_{n,2}$

FIG. 3

$$kxb := 15..15+Num\_Meters$$

$$LR := READPRN(lastrow)$$

$$Comp_{1,b} := LR_b$$

$$cc := 2..rows(Comp)$$

$$lostsales_{kxb-14} := if\left[(Gross=1),\left[\frac{(Comp_{2,kxb})-(Comp_{1,kxb})}{denom}\right],\left[\frac{(Comp_{2,kxb})-(Comp_{1,kxb})}{denom}\right]\cdot[1+[(60-Comp_{2,9})\ ce]]\right]$$

$$lsales := \sum_{j=1}^{Num\_Meters} lostsales_j$$

$$day := [(Comp_{2,2})\cdot(-1)]-[(Comp_{1,2})\cdot(-1)]$$

$$lhour := (23-Comp_{1,3})\cdot 3600$$

$$lmin := (60+Comp_{1,4})\cdot 60$$

$$nhour := Comp_{2,3}\cdot 3600$$

$$nmin := [Comp_{2,4}\cdot(-1)]\cdot 60$$

$$ltime := if[day>0,((day-1)\cdot 86400)+lhour+lmin+nhour+nmin,if[day=0,[(Comp_{2,3}-Comp_{1,3})\cdot 3600]+lmin+nmin,-9999]]$$

$$Comp_{cc,11} := Comp_{cc,11}+Comp_{1,11}+ltime$$

$$Comp_{cc,12} := Comp_{cc,12}+Comp_{1,12}+lsales$$

FIG. 4

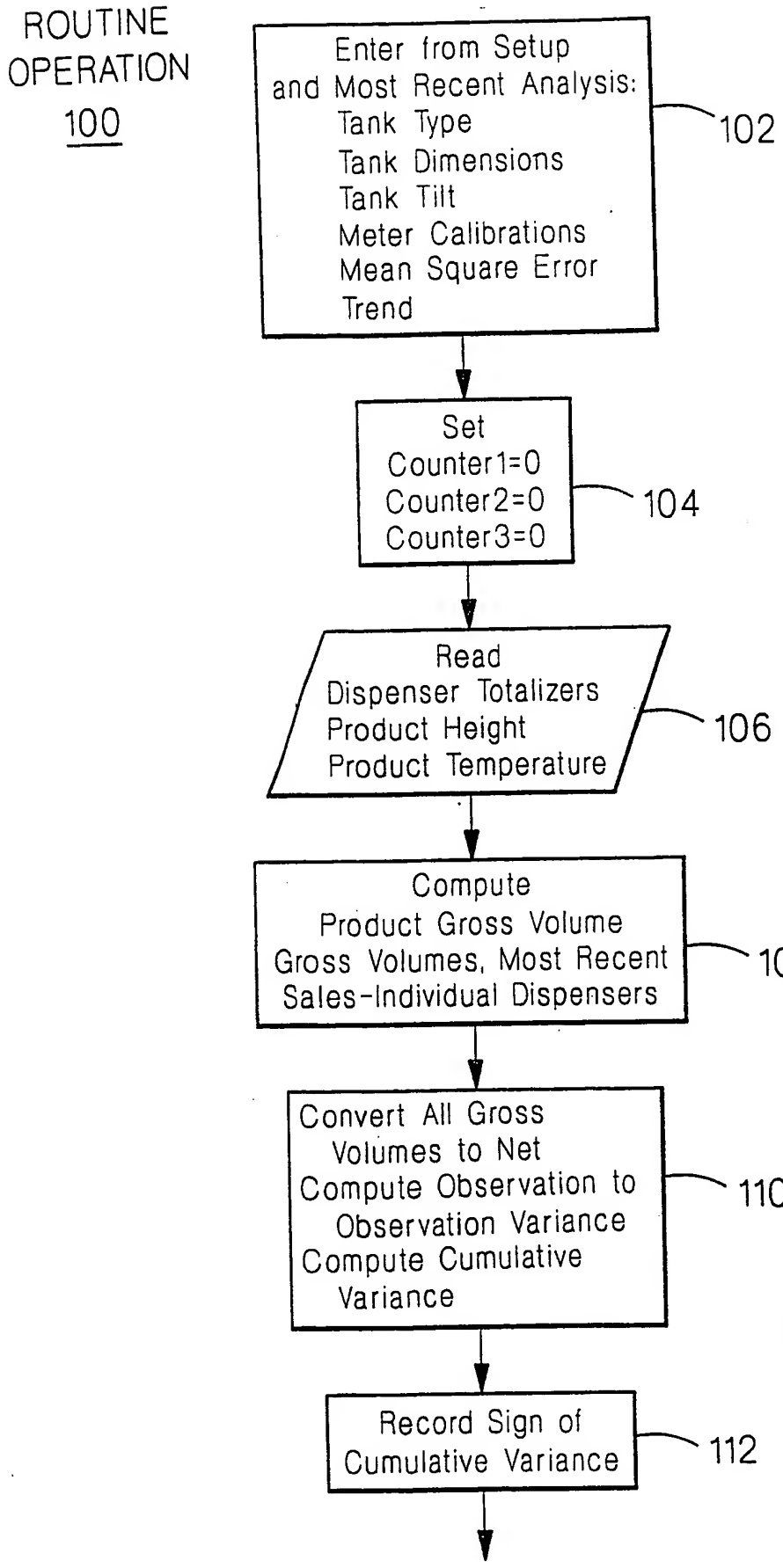
ROUTINE OPERATION 100
Enter from Setup and Most Recent Analysis:
Tank Type
Tank Dimensions
Tank Tilt
Meter Calibrations
Mean Square Error
Trend
102
Set
Counter1=0
Counter2=0
Counter3=0
104
Read
Dispenser Totalizers
Product Height
Product Temperature
106
Compute
Product Gross Volume
Gross Volumes, Most Recent Sales-Individual Dispensers
108
Convert All Gross Volumes to Net
Compute Observation to Observation Variance
Compute Cumulative Variance
110
Record Sign of Cumulative Variance
112

FIG. 5

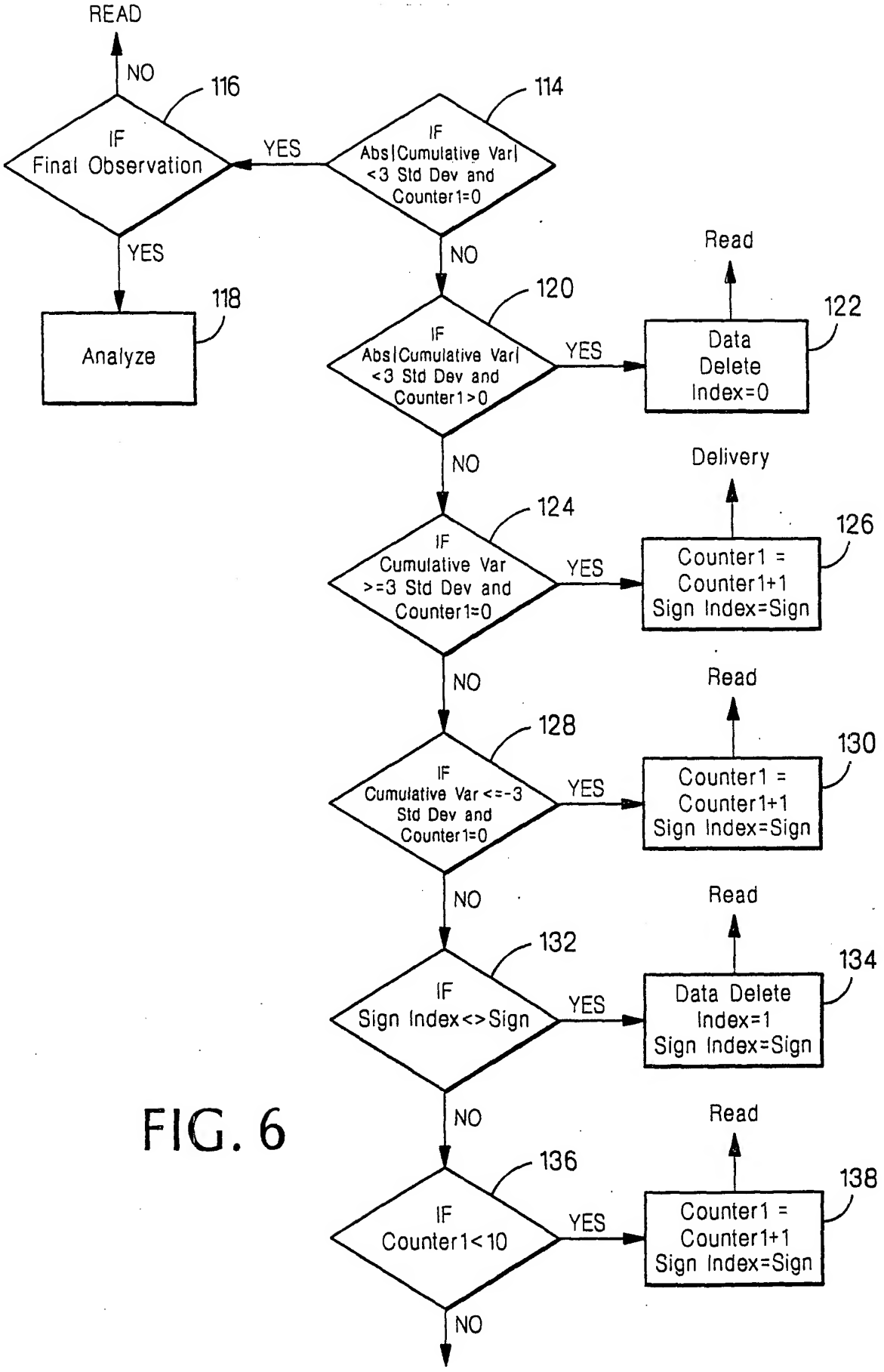
READ
NO
116
IF
Final Observation
YES
114
IF
Abs|Cumulative Var|
<3 Std Dev and
Counter1=0
YES
NO
118
Analyze
120
IF
Abs|Cumulative Var|
<3 Std Dev and
Counter1>0
YES
Read
122
Data
Delete
Index=0
NO
124
IF
Cumulative Var
>=3 Std Dev and
Counter1=0
YES
Delivery
126
Counter1 =
Counter1+1
Sign Index=Sign
NO
128
IF
Cumulative Var <=-3
Std Dev and
Counter1=0
YES
Read
130
Counter1 =
Counter1+1
Sign Index=Sign
NO
132
IF
Sign Index<>Sign
YES
Read
134
Data Delete
Index=1
Sign Index=Sign
NO
136
IF
Counter1<10
YES
Read
138
Counter1 =
Counter1+1
Sign Index=Sign
NO

FIG. 6

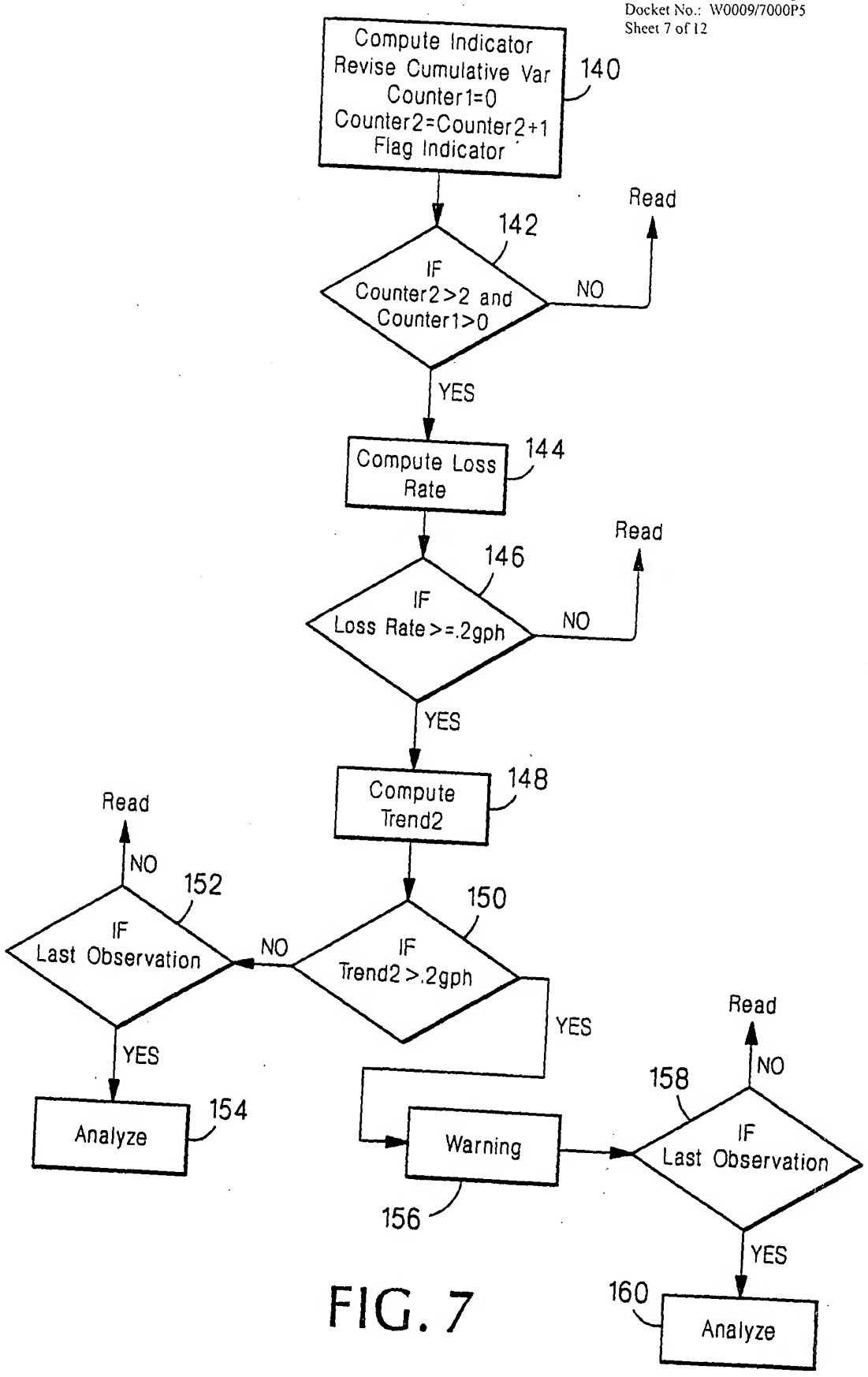
Compute Indicator
Revise Cumulative Var
Counter1=0
Counter2=Counter2+1
Flag Indicator
140
142
IF
Counter2>2 and
Counter1>0
NO
Read
YES
Compute Loss
Rate
144
146
IF
Loss Rate>=.2gph
NO
Read
YES
Compute
Trend2
148
150
IF
Trend2>.2gph
NO
152
IF
Last Observation
NO
Read
YES
Analyze
154
YES
Warning
156
158
IF
Last Observation
NO
Read
YES
160
Analyze

FIG. 7

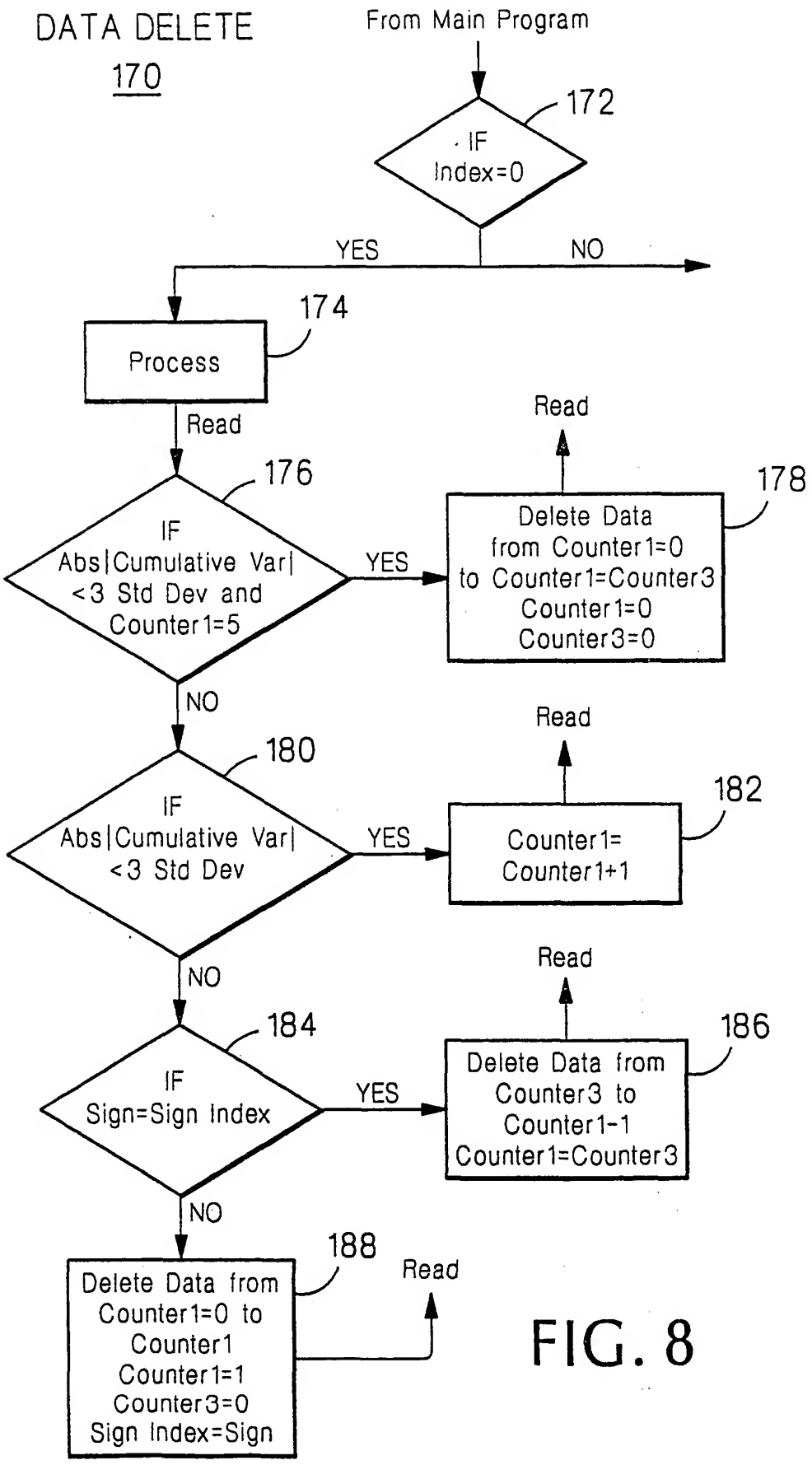
DATA DELETE
170
From Main Program
172
IF
Index=0
YES
NO
174
Process
Read
176
IF
Abs|Cumulative Var|
<3 Std Dev and
Counter1=5
YES
178
Delete Data
from Counter1=0
to Counter1=Counter3
Counter1=0
Counter3=0
Read
NO
180
IF
Abs|Cumulative Var|
<3 Std Dev
YES
182
Counter1=
Counter1+1
Read
NO
184
IF
Sign=Sign Index
YES
186
Delete Data from
Counter3 to
Counter1-1
Counter1=Counter3
Read
NO
188
Delete Data from
Counter1=0 to
Counter1
Counter1=1
Counter3=0
Sign Index=Sign
Read

FIG. 8

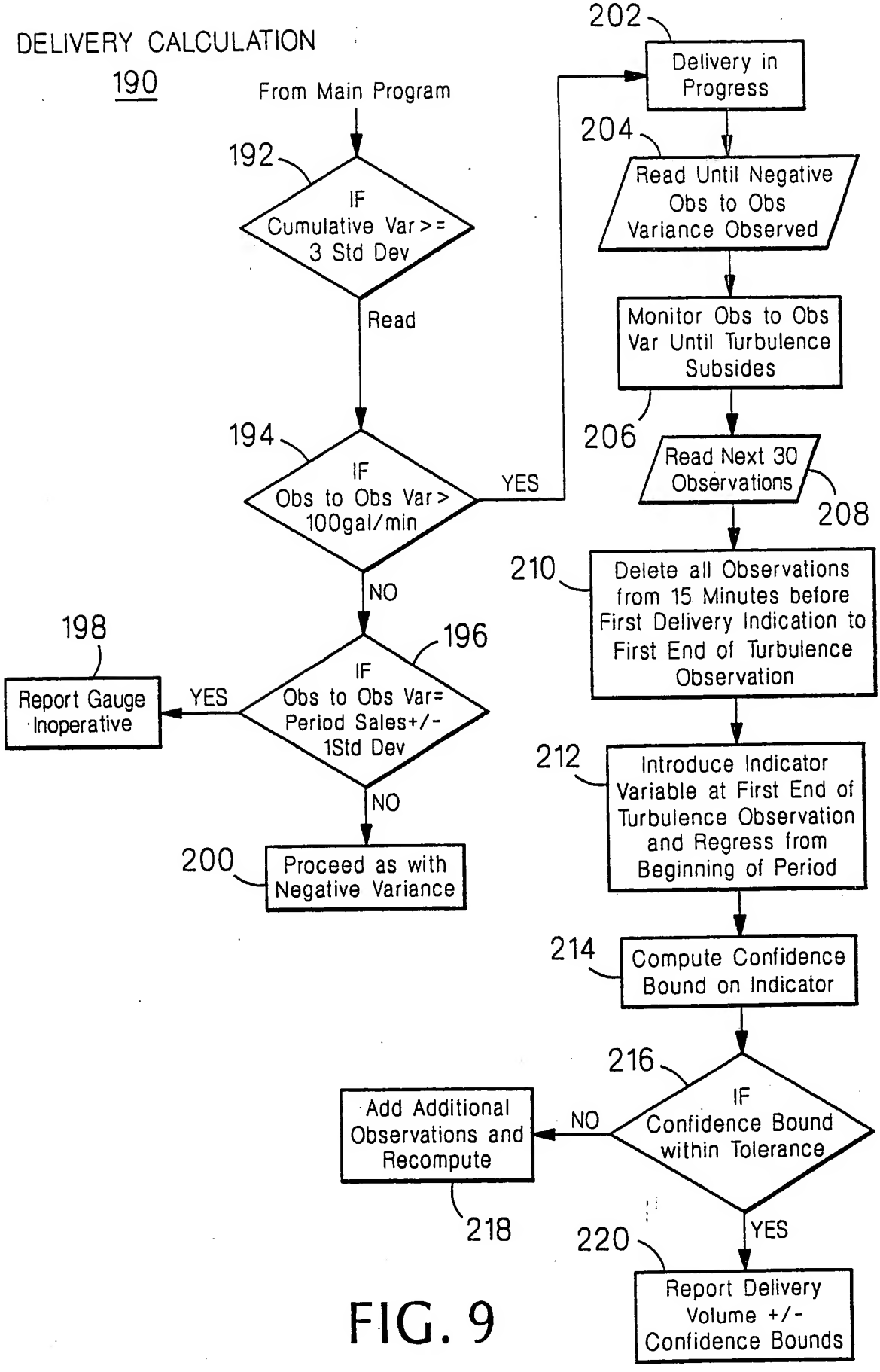
DELIVERY CALCULATION
190
From Main Program
192
IF Cumulative Var >= 3 Std Dev
Read
194
IF Obs to Obs Var > 100gal/min
YES
NO
196
IF Obs to Obs Var= Period Sales+/- 1Std Dev
198
Report Gauge Inoperative
YES
NO
200
Proceed as with Negative Variance
202
Delivery in Progress
204
Read Until Negative Obs to Obs Variance Observed
Monitor Obs to Obs Var Until Turbulence Subsides
206
Read Next 30 Observations
208
210
Delete all Observations from 15 Minutes before First Delivery Indication to First End of Turbulence Observation
212
Introduce Indicator Variable at First End of Turbulence Observation and Regress from Beginning of Period
214
Compute Confidence Bound on Indicator
216
IF Confidence Bound within Tolerance
NO
Add Additional Observations and Recompute
218
YES
220
Report Delivery Volume +/- Confidence Bounds

FIG. 9

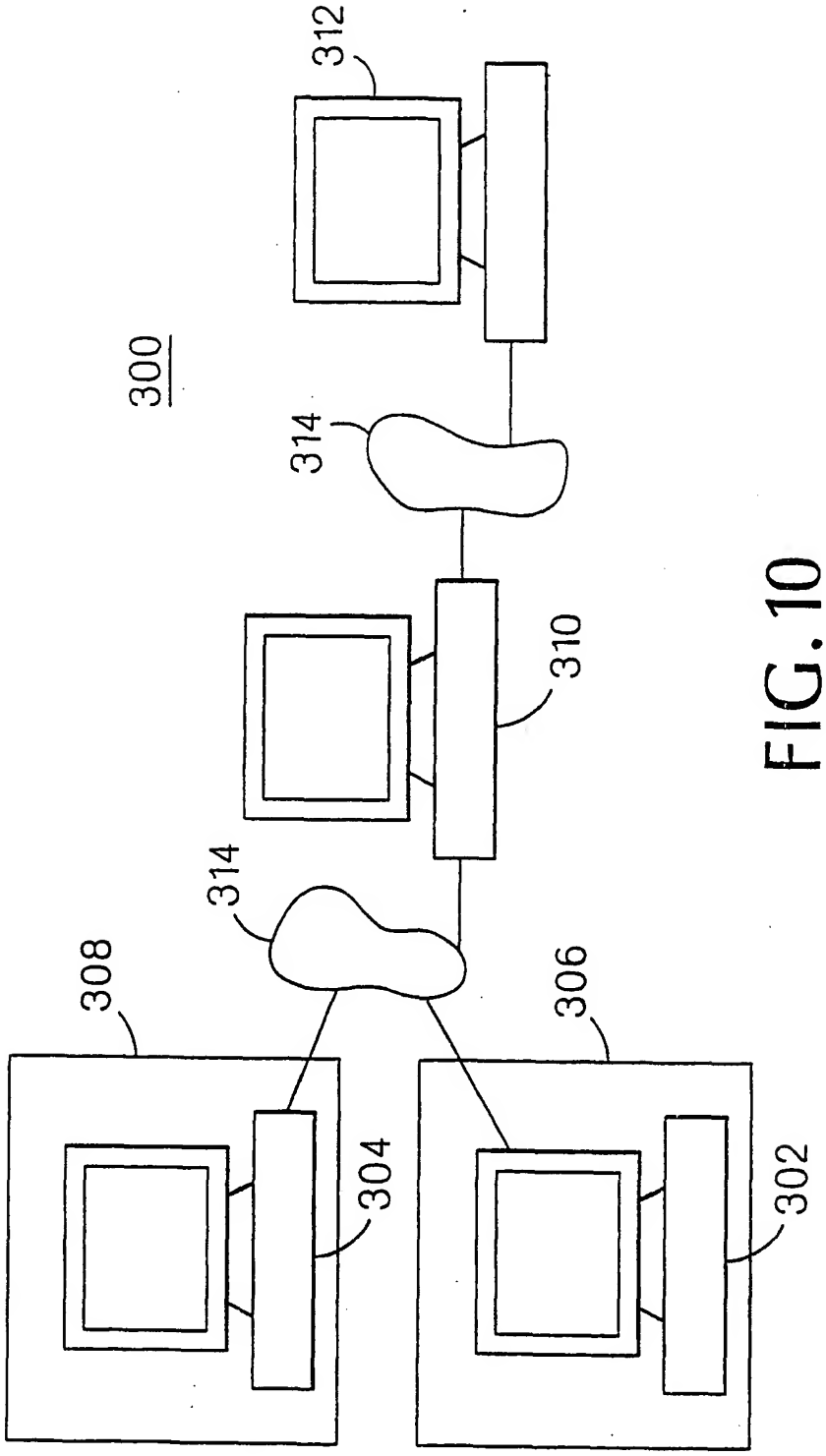


FIG. 10

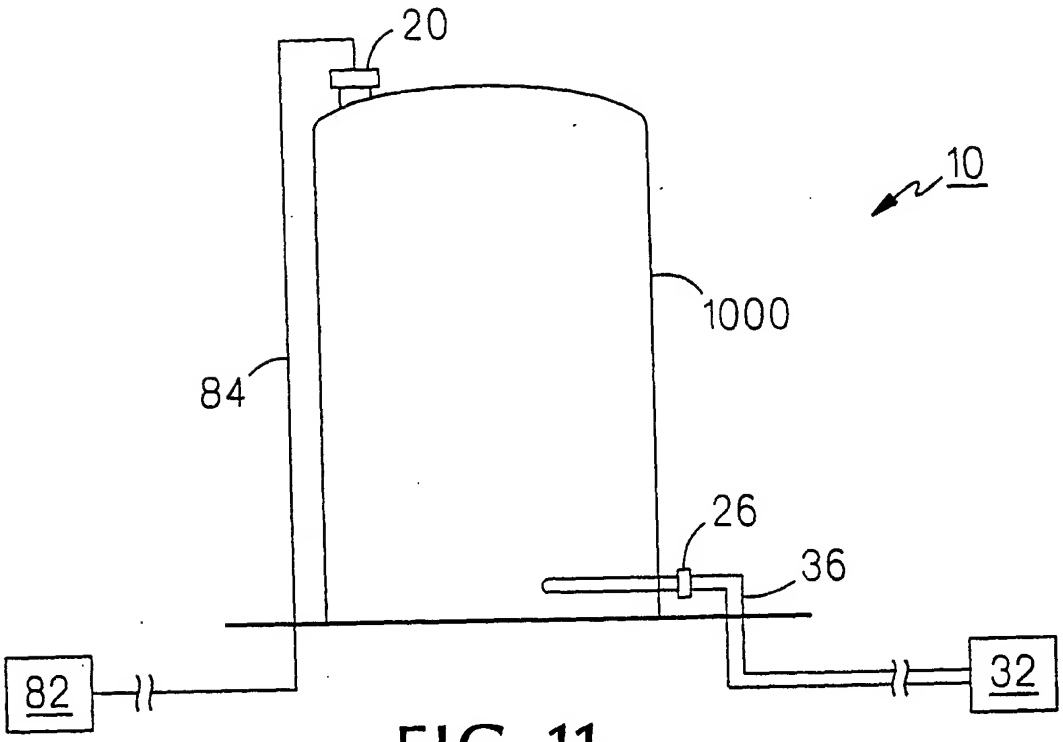


FIG. 11

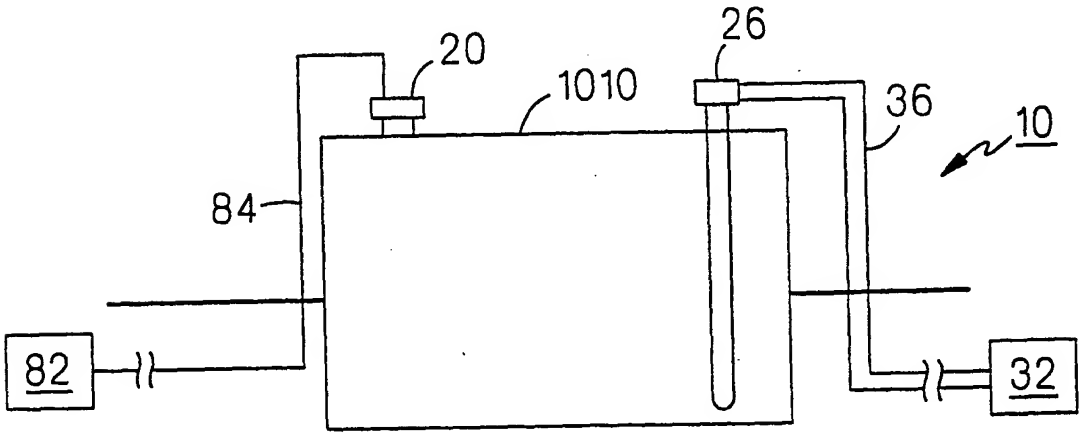


FIG. 12

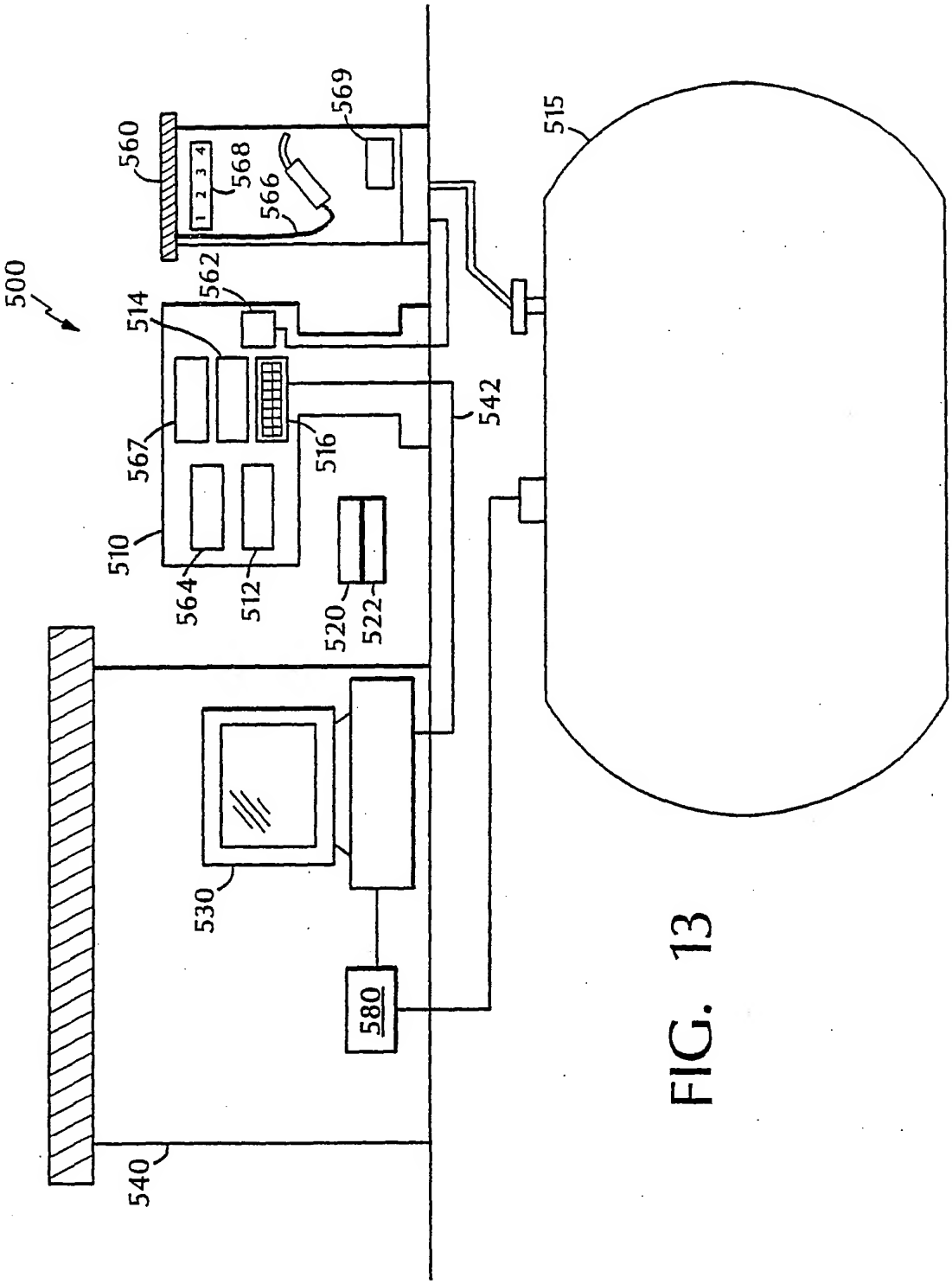
500
560
1 2 3 4
568
566
569
515
562
514
542
567
516
510
564
512
520
522
530
580
540

FIG. 13